The 15th IEEE International Conference on Green Energy & Smart Systems (IEEE GESS 2024)

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Keynote Speakers: https://site.ieee.org/clas-sysc/keynote-speaker

Keynote Speaker-1: **Dr. James H. Lambert** (IEEE Fellow, University of Virginia - Janet Scott Hamilton and John Downman Hamilton Professor)

❑ **Title**: Activating Interdualities and Systemic Orders in Sustainable Energy and Enterprise Systems

❑ **Abstract**: Intelligence augmentation of technology enterprises has to recognize both evolving orders and ambiguities of human impulses. This Keynote talk navigates systemic orders via a theoretical frame-work of interdualities with real-world appli-cations to sustainability. Systemic orders encompass assets, resources, inve-stments, sites, facilities, fuels and their byproducts, feedstocks, policies, specifi-cations, controls, supplers etc. Key to this framework is the impact of disruptive factors—such as innovations, market shifts, obsolescence, regulations, behaviors, environmental changes, missions, workforce capabilities, competitors and more. The talk will explore how interdualities can influence system requirements through periods of disruption and evolving orders over several time horizons. Accounting of systemic orders is fundamental to negotiations and systems engineering at the interfaces of technology disciplines. The talk features a range of examples: Electrification of maritime container ports, energy facilities of countries in transition, trust and security of green automation, decarbonization of aviation, supply chains of smart devices, and AI/IA for resilience of infrastructure systems.

❑ **Bio**: James H. Lambert is with the Department of Systems & inform-ation Engineering; Department of Civil & Environmental Engineering, at the University of Virginia, USA. Dr. Lambert is a globally known educator in systems engineering and risk analysis including green energy and smart systems, with over thirty years of experience.

As the Director of UVA's Center for Risk Management of Engineering Systems and a Site Director of the US National Science Foundation Center for Hardware & Embedded Systems Security & Trust, his expertise includes mitigating risks across energy, logistics, aviation, medicine, transportation, security and safety-critical systems.

Dr. Lambert's research has received best-paper recognitions of IEEE, the International Conference on Systems Engineering (ICSEng), the American Chemical Society and other venues. He served as President of the worldwide Society for Risk Analysis, chaired conferences including the 8th International Engineering Systems Symposium and the 5th World Congress on Risk, and leads a study on wildfires of the Permanent Monitoring Panel for Mitigation of Catastrophic Risks, with the World Federation of Scientists and Seminars on Planetary Emergencies. Dr. Lambert has delivered keynotes at IEEE and other international conferences. His presentations feature breakthroughs of paradigms, methods and solutions, motivating an audience to address the latest challenges of systems engineering and risk management. Dr. Lambert is a Fellow of each of IEEE, the American Association for the Advancement of Science, the Society for Risk Analysis, and the American Society of Civil Engineers. He is an alumnus of Princeton

Keynote Speaker-2: **Dr. Nak-seung Patrick Hyun** (Purdue University - Assistant Professor, IEEE GESS 2024 - TPC Chair, Harvard University - Research Associate, Georgia Institute of Technology - PhD

❑ **Title**: Autonomous Control of Bio-Inspired Extreme Behaviors in Robotics

❑ **Abstract**

Highly agile and extreme behaviors of many biological systems offer examples for future research directions to target similar mobility in bio-inspired robots understanding of the complex dynamics and subsequent design of a robust and adaptive control framework. Examples of extreme behaviors in biological systems are the fast oscillation-driven maneu-vers of bees flapping their wings around 200 Hz and the rapid impulsive striking of mantis shrimp releasing their stored potential energy within milliseconds. The challenges for control of robots with similar extreme behaviors lie in the highly nonlinear dynamics operating over multiple timescales. Specifically, one has to account for fast dynamics (extreme motions) and slow dynamics (time-averaged motion or slower drift in the system), and the time-varying actuation model in the high-frequency regime (fast-dynamics) vs the low-frequency regime (slow dynamics). This talk will address the control-theoretic aspects of dealing with such challenges in bio-inspired robots based on first principles in mathematical system theory. The first part of this talk will address the recent progress on controlling the Harvard Robobee, an insect scale flapping-wing vehicle that flaps its wings around 150Hz and a bird scale robot flapping around 20 Hz. In addition, the recent findings in the nonlinear modeling of the dynamic principles of mantis shrimp strike will be covered, which allows the striking speed to reach 27 m/s within a few milliseconds. The bifurcation analysis on the latch-mediated spring actuation system will be covered to find the intrinsic properties of impulsive biological and synthetic systems.

❑ **Bio**

Nak-seung Patrick Hyun is an assistant professor in Electrical and Computer Engineering at Purdue University. His research focuses on the control-theoretic aspects of bio-inspired robots, emphasizing systems with extreme behaviors, such as flapping vehicles and impulsive systems. He is interested in the broad range of nonlinear control, including optimization-based control, geometric control, and contraction-based control. His research program provides a cyclic learning cycle between biology, mathematical system theory, and robotics. He was formerly a research associate at the Harvard Microrobotics Laboratory, hosted by Robert J. Wood. He received a Ph.D. in electrical and computer engineering in 2018, an M.S. degree in mathematics in 2013, and an M.S. degree in electrical engineering in 2013 from the Georgia Institute of Technology. He is the recipient of The Ruth and Joel Spira Outstanding Teacher Award at Purdue ECE department in 2024. His previous research at Georgia Tech addresses a new framework of causal modeling of impulsive systems and optimal safe path planning for multi-agent systems.

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Keynote Speaker-3: **Cody Taylor** (California Energy Commission – Manager of the Industry & Carbon Management Branch in R&D Division)

❑ **Title**: California: Still Innovating After All These Years

❑ **Abstract**: The California Energy Commission is leading the state to a 100 percent clean energy future for all. As the state's primary energy policy and planning agency, the Energy Commission plays a critical role in creating the energy system of the future - one that is clean, is modern, and keeps the fifth largest economy in the world thriving. The CEC invests in innovation across a range of technology areas, as well as programs to build out the infrastructure to mee the state's clean energy goals.

❑ **Bio**: Cody Taylor is Manager of the Industry and Carbon Management Branch in the R&D Division of the California Energy Commission. CEC funds research, development, and demonstration projects to meet the state's energy and climate goals. Prior to the Energy Commission, Cody worked on energy policy at Southern California Edison and on technology deployment and policy at the U.S. Department of Energy.

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Panel Speakers: Bill Beverly, Jacquelyn Birdsall, John Keisler, Cory Shumaker

❑ **Title:** Building a Zero-Emission Vehicle Ecosystem

❑ **Abstract**

The State of California mandates that, by 2030, 68% of new cars sold in the state must be electric, plug-in hybrid electric, or hydrogen fuel cell. Five years later, that percentage goes to 100. On the freight side, by 2035 all drayage trucks, responsible for moving containers to and from the Long Beach Los Angeles Port Complex, must also meet zero-emission standards. These deadlines require community support and present a wide range of challenges associated with coordination and cooperation between industry leaders, and across local, state, and federal agencies. Indeed, coordination of this magnitude demands an entire ecosystem with: simultaneous and synergistic operation of electricity and hydrogen production and delivery; technological/infrastructure development; and related research and learning development efforts to prepare the emergent zero-emission workforce. Thus, zero-emission mandates translate to a call to action for leaders in industry, government, and education to develop civic-market innovations to build an ecosystem that is environmentally, economically, and socially sustainable. The proposed panel—moderated jointly by CSULB's AVP of Research and Sponsored Programs and Executive Director of the Center for International Trade and Transportation—will discuss strategies to plan, build, operate and maintain a zero-emission vehicle ecosystem to power battery-electric and hydrogen fuel cell boats, trucks, trains, and cars in Southern California. Panelists will address near-term implementation strategies that leverage cost advantages through fuel savings, tax credits, and state and federal incentives.

❑ **Bio of the Panelists**

Bill Beverley is a Co-Founder and Co-CEO at Evolectric. Evolectric focuses on easing the fleet electrification transition across all forms of commercial transportation by providing tailored solutions to any operational needs while complying with environmental regula-tions. Bill leads their technology and product development, program management, technical sales and overall business development. Bill has fifteen years of experience in power distribution and expertise in vehicle electrification and batteries. He has a Bachelor of Science degree in Mechanical Engineering from CSULB.

Jacquelyn Birdsall is the Senior Engineering Manager of the Fuel Cell Integration Group at Toyota Motor North America Research and Development. Birdsall specializes in hydrogen infrastructure, high pressure hydrogen systems and associated standards and regulations. She has over twenty years of experience in hydrogen, including a thirteen-month assign-ment at the Toyota Motor Corporation Global Headquarters in Japan working on the 2021 Toyota Mirai. Birdsall received a Bachelor Science degree in Mechanical Engineering from Kettering University (previously General Motors Institute).

John Keisler, MPA is the CEO & Managing Partner for Sunstone Management Inc., a venture capital firm located in Southern California that invests in diverse early-stage technology startups through innovative public-private partnerships that blend unique expertise across government, education, and private sectors. Johns spent over 20 years in public service, most recently as the Economic Development Director for the City of Long Beach. John received his Masters of Public Administration from the University of Southern California.

Cory Shumaker, MBA, serves as the Head of Business Development and Hydrogen Solutions for Fleets at Hyzon Motors. He is also the Director of Market Development for the California Hydrogen Business Council (CHBC). Cory received his Bachelor's Degree in Electr-ical Engineering at CSULB and received his MBA in International Business & Entrepreneurship at Loyola Marymount University. Shumaker is currently serving as an external advisor for a Hydrogen Hub Blueprint study funded by the Mineta Transportation Institute.

Marc Deutsch is the head of the New Business Execution Department within Auto Sales at American Honda Motor Co., Inc., (AHM) responsible for the sales strategy and market introduction of Honda and Acura electric vehicles in the U.S. Deutsch joined American Honda in 2016 with the Alternative Fuels Sales and Marketing Division, helping launch the Honda Clarity lineup, which included plug-in hybrid, battery-electric, and hydrogen fuel-cell electric models. In July 2019, he oversaw the Electric Vehicles Unit, responsible for U.S. sales strategy for Honda electric vehicles as well as launching the AHM fleet management program. In 2020, he assumed additional responsibilities overseeing the market introduction of the Acura NSX Type S supercar. In 2021, Deutsch assumed his current position, leading the New Business Execution Department for American Honda, where he has supported the sales launch of the all-new 2024 Honda Prologue and 2024 Acura ZDX , as well as the 2025 Honda CR-V e:FCEV fuel cell electric vehicle. Deutsch holds a B.S. in Aeronautical Engineering and an M.B.A.

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Workshop Speaker-1: **Dr. Yingqi Xiong** (Microsoft – Senior Applied Scientist)

❑ **Title**: Current state of AI Research and Application

❑ **Abstract**

This talk will explore the current state of Artificial Intelligence (AI) research and its transformative applications across industries. It will focus on recent advancements in large language models, such as GPT and its successors, highlighting their impact on natural language understanding, generation, and communication.

It will also delve into the progress made with stable diffusion models, a key development in generative AI, showcasing their growing influence in the realms of image creation, video synthesis, and other creative applications.

In the application domain, the presentation will discuss how these models are being integrated into business processes, from automating customer service to enhancing decision-making through advanced data analysis. The consumer side will highlight AI-driven personalization, entertainment, and virtual assistants, emphasizing the tangible ways in which AI is shaping daily life. The talk aims to provide a comprehensive overview of the cutting-edge research and practical implementations driving AI's rapid evolution.

❑ **Bio**

Yingqi Xiong holds a PhD from UCLA and a master's degree from Northwestern University. With 6 years of industry experience in machine learning and data science, Yingqi has a diverse background in both finance and technology. At Goldman Sachs, Yingqi served as Vice President, contributing to the Apple Card project and later working as an IBD M&A desk quant. Currently, Yingqi is a Senior Applied Scientist at Microsoft, where he is responsible for advancing AI capabilities in Microsoft Teams.

Workshop Speaker-2: **Dr. Yu-Wei Chung** (Ford Motor Company - Research Engineer)

❑ **Title**: Enhancing Electric Vehicle Reliability through Predictive Maintenance Using Advanced Data Analytics

❑ **Abstract**

As electric vehicles (EVs) continue to gain traction in the automotive market, ensuring their long-term reliability and performance has become increasingly critical. Predictive maintenance, powered by advanced data analytics and machine learning, offers a transformative approach to monitoring and optimizing key vehicle components such as batteries, motors, and inverters.

By leveraging real-time sensor data, predictive models can detect early signs of wear, degradation, or failures, enabling timely interventions that minimize downtime and reduce maintenance costs.

❑ **Bio**

Yu-Wei is a PhD graduate from Smart Grid Energy Research Lab (SMERC), UCLA in the year 2020, specializing in Electric Vehicle and Smart Grid integration, with a focus on EV charging data analysis and machine learning algorithms. After graduation, Yu-Wei worked at Xos Trucks as an Advanced Diagnostic Engineer, monitoring high-voltage battery degradation and contributing to smart auto parking systems using object detection algorithms. Currently, he is a Research Engineer at Ford Motor Company, focusing on prognostics algorithms for 12V and high-voltage battery degradation.

Workshop Speaker-3: **Edward Youn** (Clear Skies Hydrogen – Principal Engineer)

❑ **Title**: Introduction to Hydrogen Mobility

❑ **Abstract:**

Green energy initiatives mandate the complete adoption of zero-emission vehicles in the coming decades. Currently, the primary options available are battery electric vehicles (BEV) and hydrogen fuel cell electric vehicles (FCEV). This workshop seeks to briefly review the key differences between these two types of vehicles in terms of applications and challenges. Additionally, we will delve into the details of FCEV charging processes and why FCEVs are advantageous in replacing the current heavy-duty vehicles like buses and trucks. The workshop will provide an in-depth understanding of the main challenges and opportunities in scaling the hydrogen mobility market, focusing on the infrastructure side.

❑ **Bio**

M.S. in Mechanical Engineering, Vehicle System Dynamics - GNU, 2016
B.S. in Electrical Engineering, Computer Science - UCLA, 2013

As the Principal Engineer at Clear Skies Hydrogen (CSH2), Edward develops hydrogen refueling solutions to address the chicken-and-egg problem of the hydrogen mobility market.

In the past seven years of developing and deploying hydrogen systems as the Project Manager at Air Liquide and Systems Engineer at NICE America Research, Edward has been a firm believer of the role of hydrogen as the key enabler of the green mobility in the near future. Edward and his team at NICE were one of the world's firsts to demonstrate the technical viability of a submerged piston pump in hydrogen refueling applications.

Workshop Speaker-4: **Samir Katte** (Microsoft – Senior Software Engineer at Microsoft)

❑ **Title**: GenAI Cloud Infrastructure

❑ **Abstract**

With the advent of GenAI technologies in the mainstream market, it has been fascinating to see AI perform unprecedented tasks like writing novels and generating life-like videos. This GenAI success has been credited to decades of research by ML scientists and major tech companies who provided the cloud infrastructure to do the training and inferencing of these large ML models. In today's talk we will see how smart systems within the cloud infrastructure work in achieving the training and inferencing goals of the current ML models.

❑ **Bio**

 Samir works as a Senior Software Engineer in the Microsoft AI division. He is responsible for the software development on the MAIA100 custom AI chip developed by Microsoft for AI applications. Previously Samir worked at Qualcomm for over seven years and developed software to achieve 3G/4G/5G wireless communications on Qualcomm's modem chipset, which is used in most smartphones all over the world. Samir has a Masters degree in Electrical Engineering from University of California-Los Angeles.

Workshop Speaker-5: **Zakary Smith** (SensFlo – Co-Founder and CEO at SensFlo)

❑ **Title**: Using Real-Time Machine Monitoring to Realize Process-Level Energy Optimization

❑ **Abstract**

In today's competitive manufacturing landscape, optimizing energy usage is more critical than ever. SensFlo's real-time machine monitoring technology empowers manufacturers to achieve process-level energy optimization. By leveraging advanced IoT sensors and AI-driven predictive analytics, SensFlo provides actionable insights that help companies reduce energy waste, enhance machine efficiency, and improve overall production performance. This talk will demonstrate how real-time monitoring can unlock previously hidden efficiencies, minimize downtime, and promote sustainable energy practices within metal and plastic manufacturing environments. Attendees will also explore real-world case studies where SensFlo's technology has led to significant cost savings and operational improvements.

❑ **Bio**

Zakary Smith is the Co-Founder and CEO of SensFlo, where he drives the company's vision for transforming manufacturing through advanced AI-driven solutions. With a degree in Mechanical Engineering and Technological Entrepreneurship from Northeastern University, Zakary has successfully launched over 100 products across diverse industries, including aerospace, automotive, and industrial sectors. His work has been instrumental in bringing groundbreaking innovations like the Tesla Model 3 and Samsung Smartwatch to market. At SensFlo, Zakary focuses on using cutting-edge technology to optimize machine efficiency and reduce operational waste, ensuring his clients stay competitive in an evolving industrial landscape.

Workshop Speaker-6: **Dr. Jim Burns**

❑ **Title**: Mobile DC Fast Charging of EVs from Scratch - All the Pieces

❑ **Abstract:**

Deployable, mobile fast charging for temporary demands, initial charge infrastructure buildout, and disaster relief, has seen a surge in demand. This presentation shares experience from a product development standpoint for a commercial, trailer-based, 600kWh, 90kW (expandable) DC Fast-charge product. Design, fabrication, integration, software development, testing and deployment are discussed. Experiences and edge case lessons learned while charging three different passenger EVs will be shared.

❑ **Bio**

Dr. Jim Burns received BSME in Engineering Science and Ph.D. U of Delaware, Mechanical Engineering. He has enjoyed a long and impactful career in the EV industry, first as a tenured professor of Engineering performing systems research and teaching students about the coming EV revolution, and then as company founder for 10 years at Transpower, a pioneering leader in development of heavy-duty electric semi-trucks, and most recently in the development of high-power charging equipment. He helped launch the electric heavy truck industry and sold to a Fortune 100 Tier 1 trucking OEM. He is pursuing new goals both business and pleasure.

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